NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

	SOIL AND ROCK LEGEND, TERM	S, SYMBOLS, AND ABBREVIATIONS	
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
L IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER om according to Standard Penetration test (AASHTO 1206, ASTM 0-1586, SOIL CLASSIFICATION 15 DO NITHE ASHTIO SYSTEM AND BASIC DESCRIPTIONS CEMERALLY SHALL INCLUDE; CONSISTENCY, COUGR, TURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL POSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: **VERSIFIER, RAY SULY OLW, MOST WITH WITEREDOCOD FIRE SAMO UNERS.MIRNUT PLASTIC. A-7-6	WELL GRADED- INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE UNIFORM- INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE (ALSO POORLY GRADED). GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS; ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL, IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 2.5 cm PER 59 BLOWS, IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK, ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLOWS: WEATHERED WEATHERED NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS	ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER. <u>AQUIFER</u> - A WATER BEARING FORMATION OR STRATA, <u>ARENACEOUS</u> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <u>ARGILLACEOUS</u> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOT PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION	ROCK (WR) PER 30 cm.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
SOLI	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNETS, GABBRO, SCHIST, ETC. GNETS, GABBRO, SCHIST, ETC. GNETS COADS CRAN WETAMORPHIC AND NON-COASTOL PLAIN	CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF S
OUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 A-6 A-7 A-1, A-1, A-2 A-4, A-5 A-6 A-7 A-1, A-1, A-2 A-4, A-5 A-6 A-7 A-1, A-1, A-1, A-1, A-1, A-1, A-1, A-1,	COMPRESSIBILITY	NON-CRYSTALLINE SEDIMENTARY ROCK THAT WOLLD YELLO SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
ASS. A-1-o A-1-b A-2-4 A-2-5 A-2-5 A-2-7 A-5 A-6 A-7 MBOL 8888888888	SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 30 MODENATELY COMPRESSIBLE LIQUID LIMIT 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY STREET, STREET	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR MASSIVE ROCK.
SSING SILT- GRANULAR SILT- MUCK,	PERCENTAGE OF MATERIAL GRANULAR SILT- CLAY	WEATHERING	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
10 30 MX50 MX51 MN SOILS SOILS SOILS SOILS SOILS SOILS SOILS	UNGANIC MATERIAL SOILS SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	<u>OF DIRECTION OUP AZIMUTH</u> : THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF MEASURED CLOCKWISE FROM NORTH. <u>FAULT</u> : A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES
LIMIT 48 MX41 MN 48 MX41 MN 48 MX41 MN 48 MX41 MN SOILS WITH C NOEX 6 MX N.P. 18 MX 18 MX 11 MN 11 MN 11 MN 11 MN 1 ITTLE OR	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, (V. SLI,) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF	RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
UP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX No MX MODERATE ORGANIC	HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE GROUND WATER	OF A CRYSTALLINE NATURE.	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT M
AL TYPES STONE FRACS. FINE SILTY OR CLAYEY SILTY CLAYEY ORGANIC	₩ATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING.	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO (SLI.) 2.5 cm. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
MAJOR GRAVEL AND SAND GRAVEL AND SAND SOILS SOILS MATTER	▼ STATIC WATER LEVEL AFTER 24 HOURS.	CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
RATING SA EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS DULL, SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS
GRADE	SPRING OR SEEPAGE	WITH FRESH ROCK.	LATERAL EXTENT.
P.I. OF A-7-5 ≤ L.L 30 : P.I. OF A-7-6 > L.L 30 CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALL'
RIMARY SOULTIME COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED	ROADWAY EMBANKMENT SPIT CPT SPIT CP	(MOD, SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK, IF TESTED, WOULD YIELD SPT REFUSAL	INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
CONSISTENCY (N-VALUE) (kN/m ²)	— П WITH SOLE BESIGNATIONS	SEVERE ALL ROCKS EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL, IN GRANITOID ROCKS ALL FELOSPARS ARE KAOLINIZED TO SOME	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF INTERVENING IMPERVIOUS STRATUM.
CENERALLY	SOIL SYMBOL AUGER BORING S- BULK SAMPLE	EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL DENSE 30 TO 50	ARTIFICIAL FILL OTHER THAN - CORE BORING SS- SPLIT SPUON SAMPLE	IF TESTED, YIELDS SPT N VALUES > 100 BLOWS PER 30 cm. VERY SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT	ROCK QUALITY DESIGNATION (R.O.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF CORE
VERY DENSE >50	ST- SHELBY TURE SMPLE MONITORING WELL SAMPLE	(V, SEV.) THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAININ SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF TH	
GENERALLY SOFT 2 TO 4 25 TO 50	MONITORING WELL SAMPLE SINGUE INFERRED ROCK LINE PIEZOMETER RS- ROCK SAMPLE	ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BLOWS PER 30 cm.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY
SILT-CLAY	TTTTTT ALLUVIAL SOIL BOUNDARY INSTALLATION RT- RECOMPACTED SLOPE INDICATOR TRIAXIAL SAMPLE	COMPLETE ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS, QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS, SAPPOLITE IS	COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHIS OF THE INTRUDED ROCKS.
HARD >30 >400	25/825 DIP/DIP DIRECTION OF INSTALLATION CBR - CBR SAMPLE ROCK STRUCTURES	ALSO AN EXAMPLE. ROCK HARDNESS	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR
TEXTURE OR GRAIN SIZE s. STD. SIEVE SIZE 4 10 40 60 200 270	SOUNDING ROD REFU SPT REFUSAL	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGISTS PICK.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N) OF A 63.5 kg HA FALLING 0.76 METERS REQUIRED TO PRODUCE A PENETRATION OF 30 cm INTO SOIL MITH A 5 cm OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 2.5 cm PENETRATION
NING (MM) 4.76 2.0 0.42 0.25 0.075 0.053	ABBREVIATIONS	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	WITH 50 BLOWS.
BOULDER COBBLE GRAVEL SAND SAND SILI CLAY (BLDR.) (COB.) (GR.) (CSE. SD.) (F. SD.) (SL.) (CL.)	AR - AUGER REFUSAL FRAC FRACTURED SL SILT, SILTY	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 6 mm DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGISTS PICK. HAND SPECIMENS CAN BE DETACHED	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL L OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY:
NAIN MM 305 75 2.0 0.25 0.05 0.005 ZE IN 12' 3' COLUMNICATION DE TERMS	BT - BORING TERMINATED FRAGS FRAGMENTS SLI SLIGHTLY CL CLAY HI HIGHLY TCR - TRICONE REFUSAL CPT - CONE PENETRATION TEST MED MEDIUM W - MOISTURE CONTENT	BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR GOUGED 1 mm DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. HARD CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 25 mm MAXIMUM SIZE BY HARD BLOWS OF THE	TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS D BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (1.5.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	DPT - DYNAMIC PENETRATION TEST NP - NON PLASTIC	POINT OF A GEOLOGISTS PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIP'S TO SEVERAL CENTIMETERS IN SIZE BY MODERATE BLOWS OF A PICK POINT, SMALL, THIN	BENCH MARK: BL 300 -L- STA. 195+86.238, 29.6 RT.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	$ullet$ - VOID RATIO PMT - PRESSUREMETER TEST eta_d - DRY UNIT WEIGHT F FINE SAP SAPROLITIC	PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 25 mm	ELEVATION: 261.308 N
LL LIQUID LIMIT	FOSS FOSSILIFEROUS SD SAND, SANDY	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY FINGERNAIL.	NOTES:
GE - WET - (W) SEMISULID: REQUIRES DAYING TO ATTAIN OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	FRACTURE SPACING BEDDING	
	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	TERM SPACING TERM THICKNESS VERY WIDE MORE THAN 3 m VERY THICKLY BEDOED > 1 m	
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL SHRINKAGE LIMIT	MOBILE B- CLAY BITS X AUTOMATIC MANUAL	WIDE 1 TO 3 m THICKLY BEDDED 0.05 - 1 m THINLY BEDDED 0.05 - 0.5 m	
REQUIRES ADDITIONAL WATER TO - DRY - (D) ATTAIN OPTIMUM MOISTURE	152 mm CONTINUOUS FLIGHT AUGER CORE SIZE:	CLOSE 5 TO 30 cm VERY THINLY BEDDED 10 - 50 mm VERY CLOSE LESS THAN 5 cm THICKLY LAMINATED 2.5 - 10 mm THINLY LAMINATED < 2.5 - mm	
PLASTICITY		INDURATION	
PLASTICITY INDEX (PI) DRY STRENGTH	TIME-CAPRIDE INSERTS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
VPLASTIC Ø-5 VERY LOW VPLASTICITY 6-15 SLIGHT D.PLASTICITY 16-25 MEDIUM	X CME-550 X CASING W/ ADVANCER HAND TOOLS:	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; CENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
D. PLASTICITY 16-25 MEDIUM H PLASTICITY 26 OR MORE HIGH	PORTABLE HOIST TRICONE	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	OTHER TRICONE TUNG,-CARB.	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	OTHER OTHER OTHER	EXTREMELY (NDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	
		John LE Granto Portous Granto	REVISED 09/15/00